

## **NASA's Space Launch System: Momentum Builds Toward First Launch**

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### **Abstract**

NASA's Space Launch System (SLS) is gaining momentum toward the first launch of a new exploration-class heavy lift launch vehicle for international exploration and science initiatives. The SLS comprises an architecture that begins with a vehicle capable of launching 70 metric tons (t) into low Earth orbit. It will launch the Orion Multi-Purpose Crew Vehicle (MPCV) on its first autonomous flight beyond the Moon and back in December 2017. Its first crewed flight follows in 2021. SLS can evolve to a 130-t lift capability and serve as a baseline for numerous robotic and human missions ranging from a Mars sample return to delivering the first astronauts to explore another planet. The SLS Program formally transitioned from the formulation phase to implementation with the successful completion of the rigorous Key Decision Point C review in 2014. As a result, the Agency authorized the Program to move forward to Critical Design Review, scheduled for 2015. In the NASA project life cycle process, SLS has completed 50 percent of its major milestones toward first flight. Every SLS element manufactured development hardware for testing over the past year. Accomplishments during 2013/2014 included manufacture of core stage test articles, preparations for qualification testing the solid rocket boosters and the RS-25 main engines, and shipment of the first flight hardware in preparation for the Exploration Flight Test-1 (EFT-1) in 2014. SLS was conceived with the goals of safety, affordability, and sustainability, while also providing unprecedented capability for human exploration and scientific discovery beyond Earth orbit. In an environment of economic challenges, the SLS team continues to meet ambitious budget and schedule targets through the studied use of hardware, infrastructure, and workforce investments the United States made in the last half century, while selectively using new technologies for design, manufacturing, and testing, as well as streamlined management approaches that have increased decision velocity and reduced associated costs. This paper will summarize recent SLS Program accomplishments, as well as the challenges and opportunities ahead for the most powerful and capable launch vehicle in history.